Topic: Average rate of change

Question: Find the average rate of change of the function over the interval.

$$f(x) = x^2$$

on the interval $[0,2]$

Answer choices:

A 0

B $\frac{1}{2}$

C 1

D 2

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Solution: D

To calculate the average rate of change of a function we'll need to use the equation for the average rate of change

$$\frac{\Delta f}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

with the given function $f(x)$ and the interval $[x_1, x_2]$. For our function $y = x^2$ over the interval $[0,2]$, we can start by calculating $f(x_1)$.

$$f(x_1) = (0)^2$$

$$f(x_1) = 0$$

Then we can calculate $f(x_2)$.

$$f(x_2) = (2)^2$$

$$f(x_2) = 4$$

Now we can use our average rate of change formula.

$$\frac{\Delta f}{\Delta x} = \frac{4 - 0}{2 - 0}$$

$$\frac{\Delta f}{\Delta x} = 2$$

The average rate of change for the function $y = x^2$ over the interval $[0,2]$ is 2.

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Topic: Average rate of change

Question: Find the average rate of change of the function over the interval.

$$f(x) = \frac{2x}{3x^2 - 1}$$

on the interval $[1,4]$

Answer choices:

A $\frac{47}{13}$

B $-\frac{13}{47}$

C $-\frac{47}{13}$

D $\frac{13}{47}$

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Solution: B

To calculate the average rate of change of a function we'll need to use the equation for the average rate of change

$$\frac{\Delta f}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

with the given function $f(x)$ and the interval $[x_1, x_2]$. For our function

$$f(x) = \frac{2x}{3x^2 - 1}$$

over the interval $[1,4]$, we can start by calculating $f(x_1)$.

$$f(x_1) = \frac{2(1)}{3(1)^2 - 1}$$

$$f(x_1) = 1$$

Then we can calculate $f(x_2)$.

$$f(x_2) = \frac{2(4)}{3(4)^2 - 1}$$

$$f(x_2) = \frac{8}{47}$$

Now we can use our average rate of change formula.

$$\frac{\Delta f}{\Delta x} = \frac{\frac{8}{47} - 1}{4 - 1}$$

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$$\frac{\Delta f}{\Delta x} = \frac{-\frac{39}{47}}{3}$$

$$\frac{\Delta f}{\Delta x} = -\frac{39}{141}$$

$$\frac{\Delta f}{\Delta x} = -\frac{13}{47}$$

The average rate of change for the function $f(x) = \frac{2x}{3x^2 - 1}$ over the interval $[1,4]$ is $-\frac{13}{47}$.

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Topic: Average rate of change

Question: Find the average rate of change of the function over the interval.

$$f(x) = 6e^x - 4\sqrt{x^3}$$

on the interval $[2,3]$

Answer choices:

A $6e^2(e-1) + 4\left(\sqrt{8} - \sqrt{27}\right)$

B $6e^3 + e^2 + 4\sqrt{8} + \sqrt{27}$

C $6e^2(e+1) + 4\left(\sqrt{8} + \sqrt{27}\right)$

D $6e^3 - e^2 + 4\sqrt{8} - \sqrt{27}$

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Solution: A

To calculate the average rate of change of a function we'll need to use the equation for the average rate of change

$$\frac{\Delta f}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

with the given function $f(x)$ and the interval $[x_1, x_2]$. For our function

$$f(x) = 6e^x - 4\sqrt{x^3}$$

over the interval $[2,3]$, we can start by calculating $f(x_1)$.

$$f(x_1) = 6e^2 - 4\sqrt{(2)^3}$$

$$f(x_1) = 6e^2 - 4\sqrt{8}$$

Then we can calculate $f(x_2)$.

$$f(x_2) = 6e^3 - 4\sqrt{(3)^3}$$

$$f(x_2) = 6e^3 - 4\sqrt{27}$$

Now we can use our average rate of change formula.

$$\frac{\Delta f}{\Delta x} = \frac{6e^3 - 4\sqrt{27} - \left(6e^2 - 4\sqrt{8}\right)}{3 - 2}$$

$$\frac{\Delta f}{\Delta x} = \frac{6e^3 - 4\sqrt{27} - 6e^2 + 4\sqrt{8}}{1}$$

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$$\frac{\Delta f}{\Delta x} = 6e^3 - 4\sqrt{27} - 6e^2 + 4\sqrt{8}$$

$$\frac{\Delta f}{\Delta x} = 6e^2(e-1) + 4\left(\sqrt{8} - \sqrt{27}\right)$$

The average rate of change for the function $f(x) = 6e^x - 4\sqrt{x^3}$ over the interval $[2,3]$ is $\frac{\Delta f}{\Delta x} = 6e^2(e-1) + 4\left(\sqrt{8} - \sqrt{27}\right)$.

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